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EVALUATION OF THE SOUTHERN PINE BEETLE INFESTATIONS ON THE  
GEORGE WASHINGTON AND JEFFERSON NATIONAL FORESTS, VIRGINIA

By

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INTRODUCTION

Aerial sketch map surveys were conducted on the James River, Warm Springs, Deerfield and Dry River Ranger Districts of the George Washington National Forest and the Newcastle Ranger District of the Jefferson National Forest in January 1976. Surveys were followed by subsequent ground examinations. The survey covered a total of 218,704 acres on the George Washington National Forest and 115,752 acres on the Jefferson National Forest. The Forest Pest Management Group conducted the surveys to determine the status and trend of southern pine beetle populations on the two National Forests.

The southern pine beetle infestations in Virginia are part of a south-wide outbreak now involving 13 states. Scattered spots of southern pine beetle activity have been reported since 1974, however, it was not until this survey in January 1976 that significant numbers of spots were reported on these districts.

METHODS

A 50 percent aerial sketch map survey was performed on five districts of the George Washington and Jefferson National Forests.<sup>1/</sup> A portion of the spots detected during the aerial phase of the evaluation were examined on the ground to confirm the cause of mortality and the percent of active spots.

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<sup>1/</sup> Detection of Forest Pests in the Southeast. 1970. U.S.D.A., USFS SA, S&PF, Div. of FPM, Pub. S&PF-7, Atlanta, GA. 51pp.

In addition, in a meeting in Harrisonburg, Virginia, the overall southern pine beetle situation in Virginia was discussed with representatives of the Virginia Division of Forestry, the George Washington and Jefferson National Forests and the National Park Service.

#### TECHNICAL INFORMATION

Insect - Southern pine beetle, *Dendroctonus frontalis* Zimm.

Hosts - Southern pine beetle is a native forest pest that will attack all species of southern yellow pine and occasionally other conifers as well. Susceptible southern yellow pines include Virginia (*Pinus virginiana* Mill.), shortleaf (*P. echinata* Mill.), and pitch (*P. rigida* Mill.).

Type of Damage - Death of the tree is the result of mining in the cambium by the southern pine beetle as it constructs egg galleries. The beetle also introduces blue stain fungi, *Ceratocystis* spp., which slow down or block conduction of water in the stem. The size of an infestation may range from a single tree to several thousand trees.

Life Cycle of the Beetle - Southern pine beetles attack in pairs and construct a winding gallery in the cambium. Eggs are deposited in niches along the sides of the galleries. The eggs hatch into whitish grubs that further mine the cambium and then construct cells in the bark where they pupate and change into adults. The new adults then mine through the bark to emerge. The complete life cycle takes about a month during the summer, and as many as four or five generations may be produced annually in the area.

#### RESULTS AND DISCUSSION

During the fall of 1975, southern pine beetle evaluations were conducted on the Clinch and Glenwood Ranger Districts of the Jefferson National Forest and on the Pedlar Ranger District of the George Washington National Forest. At that time activity was reported increasing on the two Jefferson districts and static on the Pedlar District, which has reported some activity for several years. This survey was conducted on the remaining districts of both National Forests.

The results of the survey are summarized in Tables 1-3.

Results indicate that southern pine beetle activity is moderate to high on the George Washington National Forest Districts and moderate on the Newcastle District. Of the five districts surveyed the James River District had the heaviest infestation. Spot size ranged from 1-1000 trees and the average spot size was 47 trees. There was an estimated 24,200 CCF of timber infested. The Deerfield District followed with an estimated 330 spots within the survey boundary and 6,100 CCF of timber infested. These were followed by the Warm Springs, Dry River and Newcastle Districts, respectively. The Newcastle District had an average spot size of 14 trees and an estimated 4 spots per M acres of host type. There was approximately 653 CCF of timber infested.

The area of infestation extends from the southern part of the Dry River District in the north, through the Deerfield, Warm Springs, and James River Districts to the Newcastle District in the south (Fig. 1). The infested area extends along the North Mountain and Great North Mountain ridges with most activity occurring between North Mountain and Mill Mountain on the James River District.

Eighty percent of the spots that were ground checked were actively infested with southern pine beetle. Most of the spots occurred in stands of shortleaf, pitch or Virginia pine averaging about 9" d.b.h. A majority of the spots contain submerchantable timber on inaccessible mountains and ridges.

Brood mortality due to winter kill was observed in some spots. Adults and brood in the cambial layers had been killed, however, larvae and pupae in the outer bark layers did not appear to have been affected by colder temperatures.

#### RECOMMENDATIONS

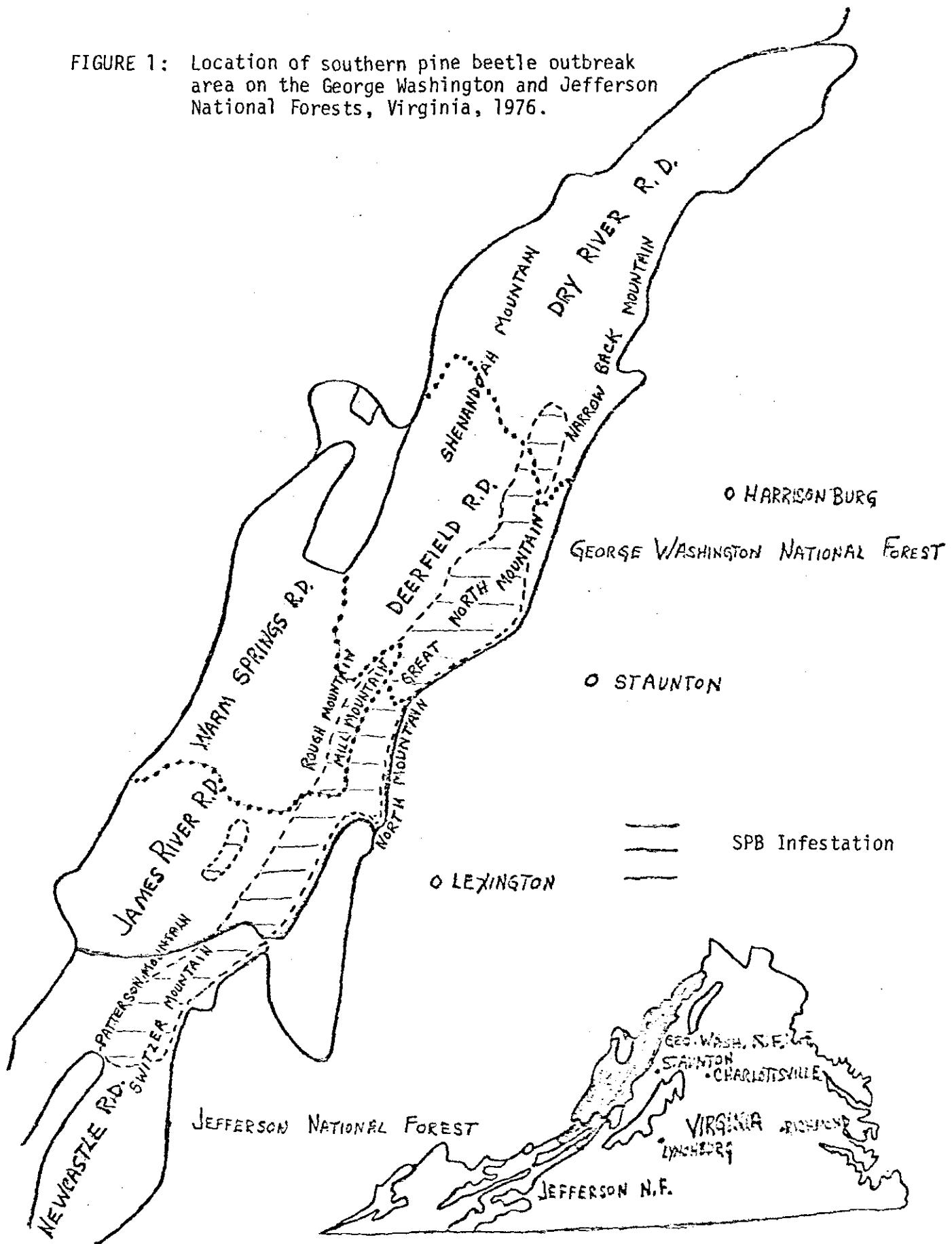
Southern pine beetle infestations have increased rapidly on the George Washington and Jefferson National Forests since 1975 and a potential outbreak situation still exists.

Should the George Washington and Jefferson National Forests submit and initiate Southern Pine Beetle Projects it is recommended that projects be submitted for only those districts reporting southern pine beetle activity.

In view of the fact that most spots contain low-value timber in inaccessible areas it is suggested that high-value areas such as plantations, sawtimber, and recreational areas be delineated on each district and priorities be established for concentrating southern pine beetle suppression efforts in these areas.

Southern pine beetle suppression activities should be in accordance with the guidelines as presented in FSM 5250 (Appendix 1).

FIGURE 1: Location of southern pine beetle outbreak area on the George Washington and Jefferson National Forests, Virginia, 1976.



## REFERENCES

Barry, P. J. and R. F. Bassett. 1975. Evaluation of southern pine beetle infestation on the Pedlar Ranger District, George Washington National Forest, Virginia. USDA, For. Serv. SA, S&PF, For. Pest Mgmt. Group. Rept. No. 76-1-11.

Thompson, J. H. and R. F. Bassett. 1975. Evaluation of southern pine beetle infestations on the Glenwood District, Jefferson National Forest, Virginia. USDA, For. Serv., SA, S&PF, For. Pest. Mgmt. Group. Rept. No. 76-1-10.

Thompson, J. H. and R. F. Bassett. 1975. Evaluation of southern pine beetle infestations on the Clinch District of the Jefferson National Forest, Virginia. USDA, For. Serv., SA, S&PF, For. Pest. Mgmt. Group. Rept. No. 76-1-16.

Table 1. Summary of the results of the southern pine beetle evaluations conducted on the George Washington National Forest, Virginia, 1976.

	Ownership Unit			
	James River	Warm Springs	Deer-field	Dry River
1. Results compiled from data collected during the aerial phase of the evaluation:				
Survey type . . . . .	Sketch map	Sketch map	Sketch map	Sketch map
Date of aerial survey . . . . .	1-13-76	1-13-76	1-13-76	1-13-76
Total acreage surveyed . . . . .	88,764	30,732	159,900	39,312
Total susceptible host type . . . . .	19,528	4,302	28,782	5,110
Total number of spots within the survey boundary . . . . .	420	134	333	107
Spots per M acre of host type (trees) . . . . .	22	31	15	21
Average spot size (trees) . . . . .	47	21	20	20
Range of spot sizes (trees) . . . . .	1-1000	1-100	1-200	1-60
2. Results compiled from data collected during the ground and aerial phases of the evaluation:				
Date of ground phase . . . . .	2-19-76	2-25-76	2-24-76	2-24-76
Infested trees per M acre of host type . . . . .	1,477	298	141	213
Total number of infested trees within the survey boundary . . . . .	28,815	1,284	4,069	1,084
Ratio of green infested to total red and fading trees . . . . .	1:12	1:4	1:2	1:3
Total volume of infested trees (CCF) . . . . .	24,205	1,335	6,104	607
Percent of spots checked infested . . . . .	80%	80%	100%	80%
	2,420.5	133.5	610.4	60.7

Table 2. Summary of the results of the southern pine beetle evaluation conducted on the Newcastle Ranger District, Jefferson National Forest, Virginia, 1976.

	Ownership Unit
	Newcastle
1. Results compiled from data collected during the aerial phase of the evaluation:	
Survey type . . . . .	Sketch map
Date of aerial survey . . . . .	1-2-76
Total acreage surveyed. . . . .	115,752
Total susceptible host type acreage . . . . .	24,308
Total number of spots within the survey boundary. . . . .	96
Spots per M acre of host type (trees) . . . . .	4
Average spot size (trees) . . . . .	14
Range of spot sizes (trees) . . . . .	1-100
2. Results compiled from data collected during the ground and aerial phases of the evaluation:	
Date of ground phase. . . . .	2-18-76
Infested trees per M acre of host type. . . . .	37
Total number of infested trees within the survey boundary . . .	900
Ratio of green infested to total red and fading trees . . . .	1:6
Total volume of infested trees (CCF). . . . .	<del>653</del> ← 65.3
Percent of spots checked infested . . . . .	80%

Table 3: Summary of the aerial data - Southern Pine Beetle Evaluation on the George Washington <sup>1/</sup>  
and Jefferson National Forests, Virginia, 1976.

Ownership	Singles	2-5 Spots : Trees	6-20 Spots : Trees	21-5 Spots : Trees	51+ Spots : Trees	Total Spots : Trees	Avg. Mult. Tree Spot <sup>2/</sup> Size
<u>George Washington NF</u>							
James River R.D.		90:303	175:2400	80:3280	75:13759	420:19737	47
Warm Springs R.D.		14:41	90:1210	20:640	10:902	134:2793	21
Deerfield R.D.	39	138:472	97:1548	34:1386	25:3225	333:6670	23
Dry River R.D.		34:103	35:175	28:780	10:1066	107:2124	20
b) <u>Jefferson NF</u>							
Newcastle R.D.	9	22:98	53:579	8:295	4:350	96:1331	15

<sup>1/</sup> Corrected and expanded to 100%.

<sup>2/</sup> single trees not included.

## APPENDIX

## GUIDELINES (from FSM 5250)

If a southern pine beetle suppression project is conducted on the District, guidelines should be followed as presented in the 5250 section of the Forest Service Manual:

1. Removal of Infested Trees by Commercial Sale or Administrative Use. When infested trees of merchantable size are accessible, they should be removed by commercial sale or administrative use procedures. Logging of infested material should begin immediately. Contract time limits should insure rapid removal.

Where practical, and if host type is present, a 40- to 70-foot buffer strip should be marked and cut adjacent to and ahead of the most recently infested trees. This practice is effective in reducing the possibility of "breakouts". When only a small volume of infested merchantable material occurs in a spot, noninfested trees surrounding the spot may be marked to provide an operable cut. The order of priority for removing beetle infested timber from a spot should be as follows:

Trees having nearly developed broods (usually the red and fading trees)

Trees having young broods (usually the green, recently infested trees)

Trees in the buffer zone

2. Piling and Burning. Unmerchantable or inaccessible southern pine beetle infestations can be suppressed by cutting, piling, and thoroughly burning the bark of infested trees. The entire bark surface must be thoroughly burned to insure effective control. The order of priority for cutting, piling, and burning infested trees, particularly the large spots, is the same as paragraph (1) under removal of infested trees by commercial sale or administrative use. Cutting a buffer strip is not recommended. To reduce the possibility of "breakouts" every effort should be made to locate and treat all green infested trees during the piling and burning operation.
3. Chemical Control. Chemical formulation recommended for southern pine beetle control is a 1/3 percent lindane spray with No. 2 fuel oil as the carrier. This may be formulated from a 20 percent lindane emulsifiable concentrate or oil concentrate at the rate of 11 pints of concentrate to enough fuel oil to make 55 gallons

of spray. (Ratio of one part 20 percent lindane EC to 39 parts No. 2 diesel fuel).

Cut, limb, and buck all infested trees into workable lengths. Spray the infested bark surface to the point of run-off. A compressed air sprayer (3-gallon capacity or equivalent) is an ideal applicator. Infested logs must be turned two or three times to insure complete treatment of infested bark. Spray stumps and bark removed by woodpeckers. Low pressure sprayers may be used to treat large, accessible infestations.

The order of priority for cutting and spraying infested trees in large spots is the same as paragraph (1) under removal of infested trees by commercial sale or administrative use. Cutting a buffer strip is not recommended. To reduce the possibility of "breakouts", every effort should be made to locate and treat all green infested trees during the chemical control operation.

Never spray trees from which southern pine beetle brood has emerged. Natural enemies of the southern pine beetle in these trees can then complete their development. To prevent aerial spotters from mapping treated spots, cut trees with red needles from which beetles have emerged.

Instructions for minimizing the adverse effects of mixing, transporting and storing pesticides, applying pesticides and disposing of pesticide containers and excess chemicals are outlined in Section 8.3 of the Forest Service Health and Safety Code and FSM 5242.21. Detailed safety procedures should be outlined in the project suppression plan.

4. Reexamination of Treated Areas. Reexamine areas where infested trees were removed by commercial sales, piled and burned, or chemically treated within two or three weeks after treatment to check for additional infested trees. If additional trees are found, treat them.

## PRECAUTIONARY PESTICIDE USE STATEMENT

Pesticides used improperly can be injurious to man, animals, and plants. Follow the directions and heed all precautions on the labels.

Store pesticides in original containers under lock and key -- out of the reach of children and animals -- away from food and feed.

Apply pesticides so that they do not endanger humans, livestock, crops, beneficial insects, fish, and wildlife. Do not apply pesticides when there is danger of drift, when honey bees or other pollinating insects are visiting plants, or in ways that may contaminate water or leave illegal residues.

Avoid prolonged inhalation of pesticide sprays or dusts; wear protective clothing and equipment if specified on the container.

If your hands become contaminated with a pesticide, do not eat or drink until you have washed. In case a pesticide is swallowed or gets in the eyes, follow the first aid treatment given on the label, and get prompt medical attention. If a pesticide is spilled on your skin or clothing, remove clothing immediately and wash skin thoroughly.

Do not clean spray equipment or dump excess spray material near ponds, streams, or wells. Because it is difficult to remove all traces of herbicides from equipment, do not use the same equipment for insecticides or fungicides that you use for herbicides.

Dispose of empty pesticide containers promptly. Have them buried at a sanitary land-fill dump, or crush and bury them in a level, isolated place.

NOTE: Some States have restrictions on the use of certain pesticides. Check your State and local regulations. Also, because registrations of pesticides are under constant review by the U.S. Department of Agriculture, consult your county agricultural agent or State Extension specialist to be sure the intended use is still registered.